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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,866	06/28/2001	Apostolos Voutsas	SLA 0592	5636

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David C. Ripma
Patent Counsel
Sharp Laboratories of America, Inc.
5750 NW Pacific Rim Boulevard
Camas, WA 98607

EXAMINER	
SARKAR, ASOK K	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 04/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/893,866	VOUTSAS, APOSTOLOS	
	Examiner	Art Unit	
	Asok K. Sarkar	2829	

-- The MAILING DATE of this communication appears on th cov r sheet with the correspondence address --

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: In pages 3 and 8 – 13, the phrase "percentage by atomic weight" should be replaced by atomic percent or at% and "5 X e^{17} atomic weight per cubic centimeter" should be replaced by 5 X 10^{17} atoms/cm^3.

Appropriate correction is required.

Claim Objections

2. Claims 4, 5, 6, 17, 18, 19 and 22 are objected to because of the following informalities:

In claims 4, 5, 17 and 18, the phrase "percentage by atomic weight" should be Deleted.

In claims 6, 19 and 22, "5 X e^{17} atomic weight per cubic centimeter (at/cm^3)" should be replaced by 5 X 10^{17} atoms/cm^3.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 – 3, 12, 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhang, US 5,569,936.

Zhang teaches a method of fabricating LCD device comprising:

- forming a target including silicon and a first concentration of first impurity (in column 3, lines 60 – 65) of transition metals such as Ni (in column 3, lines 50 – 53)
- supplying a substrate 10 with reference to Fig. 1.
- sputter depositing an amorphous Si film on the substrate with a controlled amount of second concentration of the impurity.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 4, 5, 11, 13, 15, 16 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, US 5,569,936.

Zhang teaches forming the amorphous silicon film from a composite target of Si and impurity Ni having concentration of 10^{17} atoms/cm^3 in between column 3, line 46 and column 4, line 17.

Zhang fails to expressly teach forming the Si target with single crystal silicon and first Ni concentration of 0.01 – 0.5 atom% and then depositing an amorphous Si film containing a second Ni concentration.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to form the amorphous film with a second Ni concentration from a composite target of single crystal silicon and first Ni concentration of 0.01 – 0.5 atom% since amorphous Si will be produced by sputtering from any type of Si target so long as the substrate temperature is not too high to crystallize it. Moreover, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control these parameters during the crystallization of an amorphous silicon film to form the TFT of appropriate performance characteristics through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

Note that the specification contains no disclosure of either the critical nature of the claimed processes or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen methods or upon another variable recited in a claim, the Applicant must show that the chosen methods or variables are critical (*Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir., 1990)). See also *In re Aller, Lacey and Hall* (10 USPQ 233 – 237).

7. Claims 6, 8, 9, 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, US 5,569,936 in view of Yamazaki, US 6,306,694.

Zhang teaches a method of crystallizing amorphous Si film by sputter deposition from a composite target of Si and transition metal.

Zhang fails to expressly teach adding a third concentration of P in the target to deposit the Si film with a fourth concentration of P sufficient to create a V_{th} shift

(threshold votage) in the Si film (claims 6 and 19). Zhang also fails to add a first concentration of Ge to the composite sputtering trgaet of Si to form amorphous Si film containing second concentration of Ge in the film (claims 8, 9, 21 and 22) and then adding a fourth concentration of P in the composite target to control the threshold votage of the Si film (claims 9 and 22).

Yamazaki teaches that besides Ni, Ge can also be used as a crystallization catalyst for amorphous Si in column 7, lines 37 – 42. Yamazaki, further teaches channel doping with n-type dopants such as P in column 4, lines 13 – 33 for controlling threshold voltage.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Zhang's teaching to form the amorphous film with a second Ni concentration and P concentration from a composite target of silicon and first Ni concentration and third concentration of P or amorphous film with a second Ge concentration and appropriate P concentration from a composite target of silicon and first Ge concentration and third concentration of P as taught by Yamazaki, since amorphous Si can be crystallized by adding Ge catalyst and presence of appropriate amount of P within the Si film will create the first V_{th} shift for the TFT device. Moreover, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control these parameters during the crystallization of an amorphous silicon film to form the TFT of appropriate performance characteristics through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

8. Claims 7, 10, 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, US 5,569,936 in view of Yamazaki, US 6,306,694 as applied to claims 1, 3, 12 and 16 above, and further in view of the Admitted prior Art (APA).

Regarding claims 7 and 20, Zhang in view of Yamazaki teaches about sputtering but fails to expressly teach pulsed or non-pulsed DC sputtering.

The APA teaches DC sputtering in page 5, line 4.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Zhang's teaching to form the amorphous film by pulsed or non-pulsed DC sputtering from a composite Si target since pulsed DC sputtering is a common method of sputtering semi-insulating materials.

Regarding claims 10 and 23, the APA teaches forming the impurity silicide by annealing in page 2, lines 1 – 5 by low and high temperature annealing.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention that crystallization of Zhang,s film will occur through the intermediate formation of Ni-silicide during the annealing process.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 703 238 2521. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J. Sherry can be reached on 703 308 1680. The fax phone

numbers for the organization where this application or proceeding is assigned are 703 308 7722 for regular communications and 703 308 7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 4918.

Asok K. Sarkar
April 11, 2002

VINH P. NGUYEN
PRIMARY EXAMINER
GROUP 2829
04/15/2002